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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/534,385

05/06/2005

Pierre Hermanus Woerlee

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PHILIPS ELECTRONICS NORTH AMERICA CORPORATION
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EXAMINER

HARRISON, MONICA D

ART UNIT

PAPER NUMBER

2813

DATE MAILED: 08/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/534,385

Applicant(s)

WOERLEE ET AL.

Examiner

Monica D. Harrison

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 May 2005 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 5-6-05
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-15 are rejected under 35 U.S.C. 102(e) as being anticipated by Augusto (US 2005/0167709 A1).

2. Regarding claim 1, Augusto discloses a radiation-emitting semiconductor device comprising a semiconductor body (Figure 33, *N+ Si*) and a substrate (Figure 33, *silicon substrate*), which silicon-containing semiconductor device has a lateral semiconductor diode (Figure 1, *HIP and PIN*) which is situated on an insulating layer (Figure 33, *SOI Buried oxide*) that separates the diode from the substrate (Figure 1), which lateral semiconductor diode successively comprises a first semiconductor region of a first conductivity type and with a first doping concentration (Figure 1, *N-Well*), a second semiconductor region of the first or a second conductivity type opposite to the first conductivity type and with a second doping concentration that is lower than the first doping concentration (Figure 1, *P-Well*), and a third semiconductor region of the second conductivity type and with a third doping concentration that is higher than

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the second doping concentration (Figure 1, *above the p and n wells*), the first and the third semiconductor region, each being provided with a connection region and, during operation, radiation being generated in the second semiconductor region as a result of recombination of charge carriers injected from the first and the third semiconductor region in the second semiconductor region, characterized in that the second semiconductor region comprises a central portion that is surrounded by a further portion the bandgap of which is larger than that of the central portion (Figures 1 and 33; pg.4, paragraphs 0062-0063).

3. Regarding claim 2, Augusto discloses that the bandgap of the silicon-containing semiconductor material is increased in the further portion in that the thickness of said further portion is so small that quantum effects occur therein, whereas the thickness of the central portion is so large that said effects are substantially absent (pg.1, paragraphs 0012-0013 and pg. 10, paragraph 0150).

4. Regarding claim 3, Augusto discloses that the thickness of the semiconductor body at the location of the further portion to be formed is reduced by means of a local oxidation of the semiconductor body (Figure 33, *FOX*).

5. Regarding claim 4, Augusto discloses that the thickness of the semiconductor body at the location of the central portion to be formed is reduced by means of a further local oxidation (Figure 33, *FOX*).

6. Regarding claim 5, Augusto discloses that the thickness of the further portion is 10 nm at the most, and the thickness of the central portion is at least twice the thickness of the further portion (pg.9, paragraph 0125).

7. Regarding claim 6, Augusto discloses in that the central portion is provided with sub-regions wherein the bandgap is increased with respect to the rest of the central portion by means of an ion implantation of suitable atoms (pg.2, paragraph 0028; pg.14, paragraph 0225).

8. Regarding claim 7, Augusto discloses that the substrate is made of silicon (Figure 33, *silicon substrate*).

9. Regarding claim 8, Augusto discloses a method of manufacturing a radiation-emitting semiconductor device (Figure 33), wherein an insulating layer (Figure 33, *SOI Buried Oxide*) with a silicon-containing semiconductor body (Figure 33, *N+ Si*) is present on a substrate (Figure 33, *Silicon substrate*), and a lateral semiconductor diode is formed in the semiconductor body (Figure 1, *HIP and PIN*), which semiconductor diode successively comprises a first semiconductor region of a first conductivity type and with a first doping concentration (Figure 1, *N-Well*), a second semiconductor region of the first or a second conductivity type opposite to the first conductivity type and with a second doping concentration which is lower than the first doping concentration (Figure 1, *P-Well*), and a third semiconductor region of the second conductivity type and with a third doping concentration which is higher than the second doping concentration (Figure 1, *above the p and n wells*), the first and the third semiconductor region, each being provided with a connection region and, during operation, radiation being generated in the second semiconductor region as a result of recombination of charge carriers injected from the first and the third semiconductor region in the second semiconductor region, characterized in that the second semiconductor region is provided with a central portion which is surrounded by a further portion the bandgap of which is increased with respect to that of the central portion (Figures 1 and 33; pg.4, paragraphs 0062-0063).

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10. Regarding claim 9, Augusto discloses that the bandgap of the further portion is increased by giving this portion a thickness which is so small that quantum effects occur therein in the thickness direction, while the thickness of the central portion is chosen to be so large that these effects substantially do not occur (pg.1, paragraphs 0012-0013 and pg. 10, paragraph 0150).

11. Regarding claim 10, Augusto discloses that the thickness of the semiconductor body is reduced at the location of the further portion to be formed, by means of a local oxidation of the semiconductor body (Figure 33, *FOX*).

12. Regarding claim 11, Augusto discloses that the thickness of the semiconductor body is reduced at the location of the central portion to be formed, by means of a further local oxidation (Figure 33, *FOX*).

13. Regarding claim 12, Augusto discloses that the further portion and a first portion of the central portion are formed as a continuous layer, while a second portion, situated on the first portion, of the central portion is formed by means of selective epitaxy (Figures 1 and 33; pg.5, paragraph 0073).

14. Regarding claim 13, Augusto discloses that silicon is chosen as the material for the substrate (Figure 33, *Silicon Substrate*).

15. Regarding claim 14, Augusto discloses that suitable atoms are introduced into the central portion by means of ion implantation, as a result of which the bandgap of the central portion is locally increased with respect to the rest of the central portion (pg.2, paragraphs 0025-0026).

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16. Regarding claim 15, Augusto discloses that germanium, silicon or oxygen atoms are chosen as the atoms implanted in the central portion (pg.5, paragraphs 0066-0072).

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica D. Harrison whose telephone number is 571-272-1959. The examiner can normally be reached on M-F 7:00am-3:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Monica D. Harrison
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mdh
August 4, 2006


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